

Amendments to the Claims:

The following listing of claims will replace all prior versions, and listings, of claims in the application:

1-29. (Canceled)

30. (Previously Presented) An optical system including an illumination optical system which illuminates a surface to be illuminated, the optical system comprising:

a birefringent element, disposed in an optical path of the optical system, that achieves a substantially circumferential distribution or a substantially radial distribution as a fast axis distribution in a lens aperture, the birefringent element is located at or near a position optically conjugate with the surface to be illuminated, in an optical path of the illumination optical system; and

an optical rotator disposed on an image side of the birefringent element and adapted to rotate a polarization state in the lens aperture.

31. (Currently Amended) The optical system according to Claim 30, wherein
~~wherein~~ the birefringent element includes an optically transparent member which is made of a uniaxial crystal material and a crystallographic axis of which is arranged substantially in parallel with an optical axis of the optical system, and

~~wherein~~ a beam bundle of substantially spherical waves in a substantially circular polarization state is incident to the optically transparent member.

32. (Currently Amended) The optical system according to Claim 30, wherein
~~wherein~~ the birefringent element includes at least a pair of optically transparent members made of a crystal material of the cubic system,

~~wherein~~ the pair of optically transparent members are so positioned as to achieve the substantially circumferential distribution or the substantially radial distribution as the fast axis distribution in the lens aperture, and

~~wherein~~ a beam bundle of substantially spherical waves in a substantially circular polarization state is incident to the pair of optically transparent members.

33. (Previously Presented) The optical system according to Claim 32, wherein the pair of optically transparent members are arranged in a state in which a crystal orientation $\langle 111 \rangle$ is substantially parallel with an optical axis of the optical system and in which the other crystal orientations are relatively rotated by about 60° around the optical axis.

34. (Previously Presented) The optical system according to Claim 32, wherein the pair of optically transparent members are arranged in a state in which a crystal orientation $\langle 100 \rangle$ is substantially parallel with an optical axis of the optical system and in which the other crystal orientations are relatively rotated by about 45° around the optical axis.

35. (Canceled)

36. (Previously Presented) The optical system according to Claim 30, wherein the optical rotator is located at a position where a beam bundle is incident thereto with variation of not more than 10° in an angle of incidence.

37. (Previously Presented) The optical system according to Claim 30, wherein the optical rotator rotates the polarization state in the lens aperture by about 45° .

38. (Currently Amended) The optical system according to Claim 30, ~~said optical~~ the optical system including a projection optical system which forms an image of a first plane on a second plane.

39. (Canceled)

40. (Currently Amended) The optical system according to Claim 30,

~~said optical~~the optical system including the illumination optical system which illuminates the surface to be illuminated, in a substantially telecentric manner.

41. (Canceled)

42. (Currently Amended) The optical system according to Claim 40, wherein ~~wherein~~ the illumination optical system forms a secondary light source including a predetermined optical intensity distribution, on an illumination pupil plane, and ~~wherein~~ the predetermined optical intensity distribution of the secondary light source is so set that an optical intensity in a pupil center region being a region on the illumination pupil and including an optical axis is smaller than an optical intensity in a region around the pupil center region.

43. (Previously Presented) The optical system according to Claim 42, wherein the predetermined optical intensity distribution of the secondary light source includes an optical intensity distribution of an annular shape or multi-pole shape.

44. (Currently Amended) The optical system according to Claim 30, ~~said optical~~the optical system including the illumination optical system which illuminates a first plane in a substantially telecentric manner; and a projection optical system which forms an image of the first plane on a second plane.

45. (Currently Amended) The optical system according to Claim 44, wherein ~~wherein~~ the birefringent element is located in an optical path of the illumination optical system, and ~~wherein~~ the optical rotator is located in an optical path of the projection optical system.

46. (Previously Presented) The optical system according to Claim 45,

wherein the birefringent element is located near the first plane, or at or near a position optically conjugate with the first plane, in the optical path of the illumination optical system.

47. (Currently Amended) The optical system according to Claim 46, wherein
~~wherein~~ the illumination optical system forms a secondary light source including a predetermined optical intensity distribution, on an illumination pupil plane, and
~~wherein~~ the predetermined optical intensity distribution of the secondary light source is so set that an optical intensity in a pupil center region being a region on the illumination pupil and including an optical axis is smaller than an optical intensity in a region around the pupil center region.

48. (Previously Presented) The optical system according to Claim 47,
wherein the predetermined optical intensity distribution of the secondary light source includes an optical intensity distribution of an annular shape or multi-pole shape.

49. (Currently Amended) The optical system according to Claim 30,
~~said optical~~ the optical system being an optical system for lithography.

50-93. (Canceled)

94. (Currently Amended) An exposure apparatus comprising:
an optical system which effects exposure of a predetermined pattern on a photosensitive substrate and which includes an illumination optical system which illuminates the predetermined pattern,

wherein ~~said optical~~ the optical system comprises:
a birefringent element which achieves a substantially circumferential distribution or a substantially radial distribution as a fast axis distribution in a lens aperture, and which is located at or near a position optically conjugate with the surface to be illuminated, in an optical path of the illumination optical system; and

an optical rotator located on an image side of the birefringent element and adapted to rotate a polarization state in the lens aperture.

95. (Previously Presented) The exposure apparatus according to Claim 94, wherein the optical system includes the illumination optical system which illuminates the predetermined pattern in a substantially telecentric manner.

96. (Canceled)

97. (Currently Amended) The exposure apparatus according to Claim 95, wherein ~~wherein~~ the illumination optical system forms a secondary light source including a predetermined optical intensity distribution, on an illumination pupil surface, and ~~wherein~~ the predetermined optical intensity distribution of the secondary light source is so set that an optical intensity in a pupil center region being a region on the illumination pupil and including the optical axis is smaller than an optical intensity in a region around the pupil center region.

98. (Previously Presented) The exposure apparatus according to Claim 97, wherein the predetermined optical intensity distribution of the secondary light source includes an optical intensity distribution of an annular shape or multi-pole shape.

99. (Previously Presented) The exposure apparatus according to Claim 94, wherein the optical system includes:
the illumination optical system which illuminates the predetermined pattern surface in a substantially telecentric manner; and
a projection optical system which forms an image of the predetermined pattern surface on a surface of a photosensitive substrate.

100. (Currently Amended) The exposure apparatus according to Claim 99, wherein ~~wherein~~ the birefringent element is located in an optical path of the illumination optical system, and

~~wherein~~ the optical rotator is located in an optical path of the projection optical system.

101. (Previously Presented) The exposure apparatus according to Claim 100, wherein the birefringent element is located near a first plane, or at or near a position optically conjugate with the first plane, in the optical path of the illumination optical system.

102. (Previously Presented) The exposure apparatus according to Claim 99, wherein the projection optical system forms the image of the predetermined pattern surface on the surface of the photosensitive substrate through a liquid.

103-119. (Canceled)

120. (Currently Amended) A device fabrication method comprising:
preparing a photosensitive substrate;
exposing a predetermined pattern to be transferred, on the photosensitive substrate through an optical system including an illumination optical system, ~~said optical~~ the optical system comprises a birefringent element and an optical rotator,
wherein the exposing comprises:
achieving a substantially circumferential distribution or a substantially radial distribution as a fast axis distribution in a lens aperture by the birefringent element; and
rotating a polarization state in the lens aperture being a polarization state of a beam bundle including having passed through the birefringent element, by the optical rotator;
and
illuminating the predetermined pattern through the optical system,
wherein the birefringent element is located at or near a position optically conjugate with the predetermined pattern surface, on an optical path of the illumination optical system.

121. (Currently Amended) The device fabrication method according to Claim 120,
wherein

~~wherein~~ the optical system includes the illumination optical system, and

~~wherein~~ the exposing includes illuminating the predetermined pattern in a substantially telecentric manner through the optical system.

122. (Canceled)

123. (Currently Amended) The device fabrication method according to Claim 121,
wherein

~~wherein~~ the illuminating comprises forming a secondary light source including a predetermined optical intensity distribution, on an illumination pupil plane, and

~~wherein~~ the predetermined optical intensity distribution of the secondary light source is so set that an optical intensity in a pupil center region being a region on the illumination pupil and including an optical axis is smaller than an optical intensity in a region around the pupil center region.

124. (Previously Presented) The device fabrication method according to Claim 123,

wherein the predetermined optical intensity distribution of the secondary light source includes an optical intensity distribution of an annular shape or multi-pole shape.

125. (Currently Amended) The device fabrication method according to Claim 120,
wherein

~~wherein~~ the optical system includes the illumination optical system and a projection optical system, and

~~wherein~~ the exposing includes illuminating the predetermined pattern surface in a substantially telecentric manner by the illumination optical system, and forming an image

of the predetermined pattern surface on a surface of the photosensitive substrate by the projection optical system.

126. (Currently Amended) The device fabrication method according to Claim 125, wherein

~~wherein~~ the birefringent element is located in an optical path of the illumination optical system, and

~~wherein~~ the optical rotator is located in an optical path of the projection optical system.

127. (Canceled)

128. (Currently Amended) The device fabrication method according to Claim 120, wherein

~~wherein~~ the optical system includes a projection optical system, and

~~wherein~~ the exposing includes forming an image of the predetermined pattern on a surface of the photosensitive substrate through a liquid.

129. (New) An optical system including an illumination optical system which illuminates surface to be illuminated, the optical system comprising:

a birefringent element disposed at a position near the surface to be illuminated, or a position optically conjugate with the surface to be illuminated or adjacent thereto for guiding light having S polarization for the surface to be illuminated to the surface to be illuminated.

130. (New) The optical system according to Claim 129, wherein the birefringent element includes an optically transparent member which is made of an uniaxial crystal material and a crystallographic axis of which is arranged substantially in parallel with an optical axis of the optical system.

131. (New) The optical system according to Claim 129,

the optical system including a projection optical system which forms an image of a first plane on a second plane,

wherein the surface to be illuminated is located at the first plane.

132. (New) The optical system according to Claim 131, wherein the projection optical system is arranged to be substantially telecentric on the first plane side, and

the birefringent element is located in an optical path which is substantially telecentric on the first plane side.

133. (New) The optical system according to Claim 129, wherein the illumination optical system illuminates the surface to be illuminated, in a substantially telecentric manner.

134. (New) The optical system according to Claim 129, wherein the illumination optical system forms a secondary light source including a predetermined optical intensity distribution on an illumination pupil plane, and the birefringent element is arranged between the illumination pupil and the surface to be illuminated.

135. (New) The optical system according to Claim 129, the optical system being an optical system for lithography.